

## REMARKS/ARGUMENTS

Reconsideration of this application is requested. Claims 1-15 and 17-29 are in the case.

### I. CLAIM OBJECTION

The Action notes that claim 18 has been presented twice. In response, one claim 18 has been canceled. Withdrawal of this objection is respectfully requested.

### II. THE ANTICIPATION REJECTION

Claims 15 and 17-24 stand rejected under 35 U.S.C. §102(b) as allegedly anticipated by Carlier (US 6,271,272). The rejection is respectfully traversed.

Claim 15 claims expandable pre-expanded beads having a bulk density chosen from a range of from 40 to 190 g/l and containing by weight (a) 100 parts of a polymer of styrene, (b) from 0.5 to less than 3.0 parts of at least one blowing agent and (c) from 0 to 0.4 part of at least one plasticising agent.

Carlier does not disclose "expandable" pre-expanded beads. Carlier, therefore, does not anticipate the claimed invention.

Carlier discloses expanded (as opposed to "expandable") beads and how they may be obtained. Thus, Carlier states (column 11, lines 25-37):

"In particular, these are **expanded** beads obtained from the composition of the present invention which contains... (i)..., (ii)... and (iii)...."  
(Emphasis added)

The contents of the recited components (i), (ii) and (iii) relate to the "composition of the present invention" and **not** to the "expanded beads" themselves. This is clear from the context, and is confirmed by the fact that the word "contains" in the above quote is singular (having as its subject "the composition" (singular) as opposed to the "expanded beads" (plural)).

The disclosure of Carlier therefore centers on the composition of the original polystyrene composition, and not the composition of the pre-expanded beads. There is no disclosure relating to the composition of the pre-expanded beads.

The pre-expansion process to produce the "expandable" polystyrene (column 1, lines 25-26) expels some of the blowing agent. It is not possible, therefore, to know how much blowing agent is present in the pre-expanded material referred to at column 11, lines 25-37 of Carlier (except that it must be less than the original composition). It follows that it cannot be determined from the Carlier disclosure whether this polymeric material is capable of further expansion without addition of more blowing agent.

As Carlier does not disclose the presently claimed pre-expanded expandable beads having the bulk density and composition as defined in claim 15, Carlier is not anticipatory of claim 15. Claims 17-24 are all dependent on claim 15, and they too are not anticipated by Carlier. Withdrawal of the anticipation rejection based on Carlier is respectfully requested.

### III. THE OBVIOUSNESS REJECTION

Claims 15 and 18-24 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Berghmans. Claim 17 stands rejected under 35 U.S.C. §103(a) as

allegedly unpatentable over Berghmans in view of Paleja (US 5,686,497). The rejections are respectfully traversed.

Claim 15 requires that the pre-expanded beads have a bulk density chosen from a range of from 40 to 190 g/l. The Action asserts, based on Berghmans, that:

"Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention that Berghmans as a whole teaches pre-expanded polystyrene beads that fall within the claimed ranges".

On page 4 of the Action, reference is made to particles in Berghmans "which have an apparent density  $d_0$  of 530 to 150 kg/m<sup>3</sup> (claim 2)". However, it is clear that this should be "530 to 250 kg/m<sup>3</sup>" and not "530 to 150 kg/m<sup>3</sup>". Attention in this regard is drawn to claim 1 of Berghmans (upon which claim 2 is dependent) where the broader range of apparent density is "600 to 200 kg/m<sup>3</sup>". Support for claims 1 and 2 is to be found at column 2, lines 36-51, and the broader range is set out at column 2, lines 40-41. It is further stated that "suitably the apparent density  $d_0$  ranges from 530 to 250 kg/m<sup>3</sup> (see column 2, lines 44-45).

This is the textual support for the (erroneous) range disclosed in claim 2. It is also stated that "most suitably, the apparent density  $d_0$  ranges from 450 to 350 kg/m<sup>3</sup> (see column 2, lines 50-51). Review of the claims submitted with the equivalent European application reveals that claim 2 has the correct range of 530 to 250 kg/m<sup>3</sup> (see attached).

The range of apparent densities disclosed in Berghmans (namely, 600-200, preferably 530-250, more preferably 450-350 kg/m<sup>3</sup> - see column 2, lines 36-51) is far removed from the preferred range of bulk densities set out in the present application

(40-190 g/l as recited in claim 15. Preferred ranges are 45-150 g/l, more preferably 50-125 g/l (see page 16, lines 14-15).

It would not have been obvious to one of ordinary skill in this art to take the Berghmans disclosure and to prepare pre-expanded beads having a bulk density falling outside the broadest preferred range described in Berghmans. There would have been no motivation to do so, particularly in the light of the Berghmans disclosure that the particularly preferred range is  $450\text{-}350\text{ kg/m}^3$ , which is very different from the particularly preferred range of 50-125 g/l. Withdrawal of the obviousness rejection based on Berghmans is respectfully requested.

Referring to the rejection over Berghmans and Paleja, Paleja is not relevant to the presently claimed invention. There is no disclosure or suggestion in Paleja of pre-expanded beads that are "expandable". In addition, the density of the pre-expanded beads disclosed in Table 1 is 18.5-21.0 g/l. The person of ordinary skill in the art would not therefore have applied the disclosure of Paleja to the Berghmans disclosure and, even if that had been contemplated (it is believed that it would not have occurred), the presently claimed invention would not have resulted or have been rendered obvious thereby.

A *prima facie* case of obviousness has not been generated in this case. Withdrawal of the obviousness rejections is accordingly respectfully requested.

Favorable action is awaited.

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Respectfully submitted,

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Attachment: Claims submitted with the Berghmans equivalent European application

particles expanded to a bulk density  $d$  of 14.9 kg/m<sup>3</sup>.  
The calculated ratio  $d_0/d$  was 34.9.

# Claims

1. Porous polyvinylarene particles having an apparent density  $d_0$  of 600 to 200 kg/m<sup>3</sup>, which particles contain 2.0% by weight or less, based on the amount of polyvinylarene, of a volatile organic blowing agent.
2. Particles according to claim 1, which have a apparent density of 530 to 250 kg/m<sup>3</sup>.
3. Particles according to claim 1 or 2, which contain less than 3.0% by weight, based on the amount of polyvinylarene, of water.
4. Particles according to any one of claims 1 to 3, which when exposed to saturated steam over atmospheric pressure to reach a final temperature of 105 °C for 30 seconds, expand to an apparent density which is at most three times lower than  $d_0$ .
5. Particles according to any one of claims 1 to 4, which have pores with an average pore size of 5 to 100 µm.
6. Particles according to any one of claims 1 to 5, in which the polyvinylarene is polystyrene.
7. Particles according to any one of claims 1 to 6, which further contain a nucleating agent.
8. Process for the preparation of porous polyvinylarene particles, in which expandable polyvinylarene particles containing from 0.5 to 4% by weight of a C<sub>2-6</sub> organic blowing agent, based on polyvinylarene, are pre-expanded to an apparent density of 600 to 200 kg/m<sup>3</sup>.
9. Process according to claim 8 in which the expandable polyvinylarene particles are prepared in a suspension polymerisation process in which vinylarene is polymerised in aqueous suspension in the presence of from 0.1 to 1% by weight of a free radical initiator, wherein a C<sub>2-6</sub> organic blowing agent is added before, during or after the polymerisation, wherein the amount of blowing agent is from 0.5 to 4% by weight, based on the amount of vinylarene, to yield expandable polyvinylarene particles.
10. Process according to claims 8 or 9, in which the pre-expansion of the expandable polyvinylarene particles is effected by exposing them to warm water.
11. Process according to claim 10, in which the water has a temperature of from 60 to 100°C and the

exposure has a duration of 5 to 120 min.

12. Use of the particles of claims 1 to 8 in the preparation of expanded particles and foamed articles.